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ABSTRACT

Background: Unintended pregnancies may have detrimental consequences for women's well-being and reproductive health, particularly in lower to middle-income countries. Women's involvement in household decision-making, particularly related to their health, is considered instrumental in promoting contraceptive use and other determinants of unintended pregnancy. This study aims to contribute to the existing body of knowledge on women's reproductive health by exploring if women's autonomy within the household helps prevent unintended pregnancy in Pakistan.

Methods: To explore the association between women's autonomy and pregnancy intendedness, this study posits a direct relationship between women's autonomy and pregnancy intendedness, and a moderating role of women's autonomy in the relationship between contraceptive use and perceived pregnancy intendedness. A sample of 8,228 married women age 15–49 who have experienced a pregnancy in the five years before the survey was extracted from Pakistan Demographic and Health Survey 2017–18. The dependent variable was pregnancy intendedness, which was categorized into planned, mistimed, and unwanted. A chi-square test was used to validate the association of each explanatory variable with pregnancy intendedness. The study then employed a multinomial logit model to compare the risk of mistimed and unwanted pregnancies among reproductive age women relative to the planned pregnancies. To capture the moderating role of women's decision autonomy, an interactive effect of life-time contraception and women's autonomy was estimated in the final model along with all covariates.

Results: The bivariate analysis found a significant association between women's autonomy and pregnancy intendedness at the 5% significance level, except for high autonomy. After accounting for other factors, the analysis shows that women's autonomy and pregnancy intendedness are not significantly associated. The interactive influence of women's autonomy and contraceptives was found to be insignificantly associated with pregnancy intendedness. The relative risk of mistimed and unwanted pregnancies were more prevalent pregnancies among women who ever utilized contraceptives, had terminated a pregnancy, had more sons, and belonged to wealthy families. The husband's education was inversely associated with unintended pregnancy.

Conclusion: The study concluded that women's autonomy and the interactive effect of women's autonomy and contraceptive use on pregnancy intendedness are not significant in Pakistan when other factors are considered. This may be due to data limitations, particularly those related to biased gender norms and patriarchal values in the construction of women's decision autonomy. The study results call for more in-depth investigation into social norms and patriarchal values that govern women's reproductive behavior in Pakistan.

Keywords: Multinomial logit, unintended pregnancy, son preference, women's autonomy

1   INTRODUCTION

Pakistan is a developing country with a population of 207 million. It is the fifth most populous country in the world,[1] with a high fertility rate of four children per women.[2] To control population growth, the government of Pakistan launched the Family Planning Program in 1960s, which was the first Family Planning Program (FPP) in South Asia.[3] The program promoted the use of contraceptives among women of reproductive age in order to maintain spacing between births and minimize the risk of unintended pregnancies. Female health workers provided counseling and information on family planning (FP) methods to women and their husbands, which increased women's knowledge and decision-making power about contraception use in Pakistan.[4] However, the FPP failed to achieve the target for the desired number of children and resulted in high unintended pregnancy rates.[3]

The unintended pregnancy rate increased from 71 per 10000 women age 15–49 in 2002 to 93 in 2012, which was the equivalent of 4.2 million of a total of 9 million pregnancies in 2012. Of the unintended pregnancies, 54% ended in induced abortions and 34% in unplanned births.[5] The increased prevalence of unintended pregnancy has been attributed to a high discontinuation rate of contraceptives, limited outreach of FP services, women's restricted mobility, low female labor participation, and male domination of decision-making within households.[3–7] Evidence suggests that unplanned pregnancy results in unsafe abortions, low birth weight of newborns, underutilization of reproductive healthcare, infertility, and maternal mortality.[8–10] Moreover, unplanned pregnancy reflects less women's autonomy in the decision-making related to childbearing.[11–13] In low and middle-income countries (LMICs), gender inequality and patriarchal norms are common, and women's autonomy is often limited and associated with poor reproductive health outcomes[7]

Women's autonomy has been measured by several indicators such as women's education, employment status, age at first marriage, intra-household bargaining power, and access to and utilization of healthcare services.[6,14,15] In addition, it has been observed that women in households with men who have dominant roles in decision-making do not discuss their desires about the number of children with their spouses[16] Among all indicators, women's role in household decision-making (or intra-household bargaining power) is a critical determinant of women's reproductive health outcomes[17(p13)]

Evidence has shown that women's autonomy is associated with both unintended pregnancy and contraceptive use. One study showed that women with autonomy in decision-making, particularly related to household purchasing decisions, mobility, and healthcare and financial independence have lower unintended pregnancies in India.[18] In Bangladesh, women's autonomy was found to be significantly associated with unintended pregnancy after controlling for other factors, while women who ever used contraceptives were 82% more likely to have an unintended pregnancy compared to non-users, implying contraceptive failure.[19] One study in Pakistan found a significant association of women's autonomy with lifetime and current contraceptive use. Women in the highest decision quantile had 4.8 times greater odds of using contraceptives compared to those in the lowest quantile.[6]

Moreover, the role of women's decision autonomy in contraceptive use and unintended pregnancy is complex and may interact with socio-economic factors. It Is evident that women who actively participate in their household's decision-making are also able to make informed decisions about their reproductive

health, how many children to have, when to have children, and how to space births.[20–23] Furthermore, women's autonomy may serve as a moderating variable in the relationship between contraceptive use and pregnancy intendedness.[21,24,25] A study in India established a significant role of women's autonomy as a moderating factor in the relationship between women's education and the birth-to-contraception interval. The increasing autonomy has a different effect at different educational levels. For example, an increase in autonomy coupled with secondary education increases the birth-to-conception interval among women of reproductive age.[25]

Education is an essential indicator of women's autonomy that empowers women to make informed decisions about their reproductive health. Education also enables women to negotiate with their partners about contraceptive use.[26] One study showed that women with sufficient knowledge of FP methods had a lower risk of unintended pregnancy in Nepal.[27] Examining the interactive effect of women's autonomy and life-time contraceptive use can provide insights into the moderating role of women's decision autonomy.

Early marriage limits women's opportunities for education and employment, reduces their decision-making power within the household, and increases their risk of unintended pregnancy and maternal mortality.[28] In LMICs, a high prevalence of unplanned pregnancies was found among rural women, who had no use of life-time contraceptives, and those who already had sons.[29–31] According to one estimate, in the absence of gender preference, the contraceptive prevalence would increase by 3% to 25% from the current level and pregnancy rates would decrease by 9% to 21%.[32]

This study explores the relationship between women's autonomy and the risk of unintended pregnancy among women of reproductive age in Pakistan. The study uses women's autonomy as a moderating variable in the relationship between unintended pregnancy risk and life-time contraceptive use.

1.1 Research Questions

In the context of Pakistan, this study examines the intricate interplay between women's autonomy and pregnancy intendedness. The following research questions are addressed:

1. Is women's autonomy within the household associated with the relative risk of unintended pregnancy among married women in Pakistan?

2. Does women's autonomy moderate the relationship between relative unintended pregnancy risk and contraceptive use?

3. Is women's autonomy within the household, along with other covariates, associated with unintended pregnancy risk?

1.2 Conceptual Framework

The analytical framework is presented in Figure 1. The framework shows the direct relationship between women's autonomy and pregnancy intendedness.[19,28,33,34] More highly autonomous women have strong perceptions against unwanted and mistimed pregnancies compared to their counterparts. Furthermore, women's ability to participate in decisions about their healthcare, particularly decisions about reproductive healthcare, moderates the strength of the relationship between any contraceptive method adopted to delay or prevent pregnancies and perceived pregnancy desires. The women who are more autonomous in

decision-making within their households may have greater uptake of contraceptives compared to those women with little or no autonomy.[15,16,35] In addition, women with more limited autonomy may be involved in FP, although the effectiveness of their involvement may be questionable. Moreover, contraceptives, along with other covariates (such as women's education, husband's education, women's age, age at first marriage, number of children, and sons born to a woman especially in conservative societies), influence women's perceptions of the intendedness of their pregnancies.

Figure 1   **Diagrammatic representation of the conceptual framework**
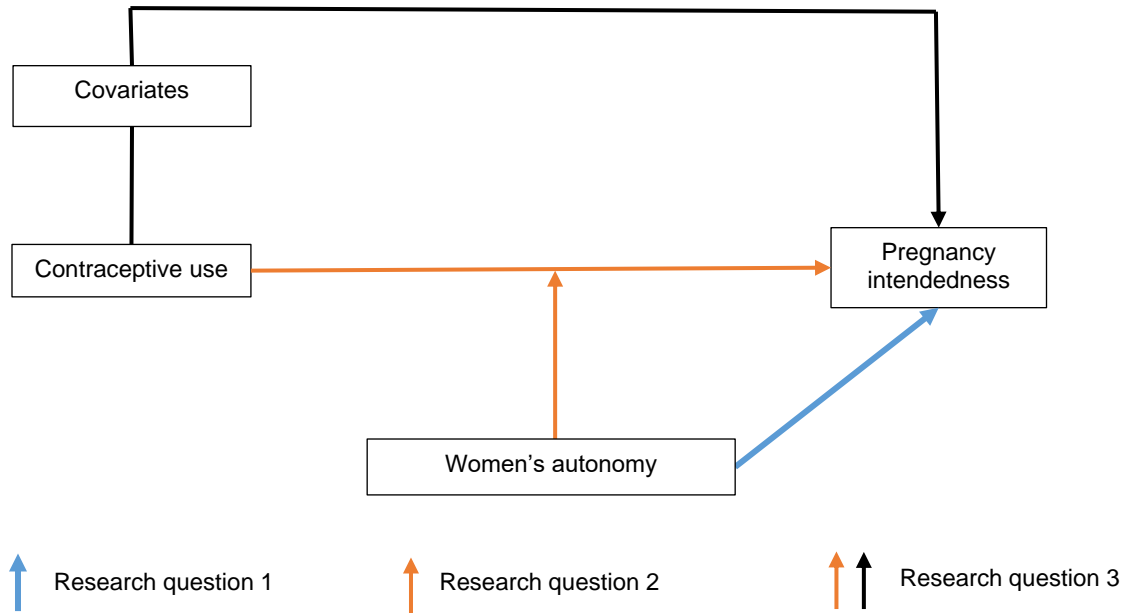
2 DATA AND METHODS

2.1 Data and Sample

This study used data from the 2017–18 Pakistan Demographic and Health Survey (PDHS). The data are cross-sectional and nationally representative. This survey was the fourth in a series, which were conducted in 1990–91, 2006–07, and 2012–13, and was implemented by the National Institute of Population Studies (NIPS) in close coordination with the Ministry of National Health Services, Regulations, and Coordination, and technical and financial partners that included USAID, DFID, and UNFPA. The survey followed a two-stage, stratified random sampling design. Details can be found in the PDHS 2017–18 report, Appendix A, pp 347 at https://dhsprogram.com/pubs/pdf/FR354/FR354.pdf.

The PDHS collected data on various health indicators and sociodemographic characteristics of all eligible married women (age 15–49) in households. This study focused on women's reproductive health and specifically on their perceptions of the intendedness of their pregnancy. Therefore, we limited the analytical sample to 8,287 married women who had experienced pregnancy in the previous five years before the survey. However, after accounting for missing values on some independent variables, the regression analysis included 6,803 for Model 1, and 6,690 for Model 2 and Model 3 (see details in Table 4).

2.2 Variables

2.2.1 Outcome Variable

The DHS provides information on the perceived desires of women age 15–49 about their pregnancies within the last five years. These included if the pregnancies were planned (women intended to have the child), mistimed (women did not want to have a child now but did later), or unwanted unintended (women did not want to have any children). This study used pregnancy intendedness as an outcome variable, comprising three possible pregnancy intentions: intended, mistimed, or unwanted.

2.2.2 Women's Autonomy

The PDHS 2017–18 provides data on women's relative role (women's input versus that of other members) in household decision-making by asking about several important household decisions. The response options included the respondent, a joint decision of the husband and wife, the husband only, and someone else in the family. In agreement with the literature, we used three critical decisions to develop a measure of women's autonomy: 1) who usually decides about the respondent's healthcare, 2) who usually decides about the respondent's visits to family, and 3) who usually decides about large household purchases.[13,15,36,37]

For each measure, we first combined the responses of "respondent herself" and "respondent and husband jointly" into one category and coded it as "1", while the other responses were coded as "0". We calculated the internal consistency of the responses using Cronbach's alpha, and obtained a score of 0.88, which indicated a high level of internal consistency. Finally, we aggregated the scores on all three decisions. The combined scores had the values of 0, 1, 2, or 3, which we categorized as: 0 implies "no autonomy", 1 "low", 2 "medium" and 3 "high". We termed the scores as the women decision-making index (WDMI).

2.2.3 Life-time Contraceptive Use

The PDHS provides information on current and life-time contraceptive use. This study employed life-time contraceptive use because it reveals the life-time history of contraceptive use among women, while the most recent or current contraceptive use does not[38] Life-time contraceptive use was used as a binary (1/0) variable in which "1" implies "contraceptives ever used," and "0" means "contraceptive not-used."

2.2.4 Other Covariates

Other covariates used in the study included women's age, categorized into three groups (15–24, 25–39, and 40–49); woman's education, with four categorical levels (no education, primary, secondary, and higher); woman's age at first marriage, with three groups (age 10–14,15–24, and 25–47); if a woman ever terminated pregnancy or not (yes or no); the total number of children ever born, categorized into three groups (1–2, 3–5, 6 and above); the number of sons born to a woman, categorized into three groups (no son, 1–3 sons, 4 and above); husband's education level, in four groups (no education, primary, secondary, and higher); household wealth, in five groups (poorest, poorer, middle, richer, and richest); and region (rural and urban).

2.3   Statistical Analysis

This study analyzed the background characteristics of the sample by calculating a percentage distribution of every variable, as all variables were categorical. A chi-square test of independence was used to determine if there was a statistically significant association between each explanatory variable (nominal/ordinal) and pregnancy intendedness (a nominal variable) by comparing the observed pattern of categories in each cell to the pattern that would be expected if two variables were entirely independent of each other.

To analyze the multivariate relationship between pregnancy outcomes and explanatory variable(s), this study used multinomial logit regression. The model is suitable for analyzing the outcome variable with unordered or nominal categories, and modeling the log odds of the outcome variable as a linear function of the predictor variables.

The study used pregnancy intendedness as an outcome variable. Three models were estimated: Model 1 estimated the relationship between women's autonomy and pregnancy intendedness to address research question 1. (see Section 1.1.) Model 2 estimated the relationship between women's autonomy and pregnancy intendedness after accounting for covariates, while Model 3 estimated the moderating role of women's autonomy in the relationship between pregnancy outcomes and contraceptive use along with all covariates (See research question 2 and 3, section 1.1.) To capture the moderating role of women's autonomy, an interactive term for women's autonomy and contraceptive use was used in Model 3 as follows:

$$\log\left(\frac{p_{j(x)}}{p_{J(x)}}\right) = \beta_0 + \beta_{1j}WDMI + \beta_{2j}womenage + \beta_{3j}womenedu$$

$$+ \beta_{4j}woman'ageatfirst\ marriage + \beta_{5j}contraceptivesever$$

$$+ \beta_{6j}WDMI\ X\ contraceptiveuseever + \beta_{7j}everterminatedpreg$$

$$+ \beta_{8j}totalchildren + \beta_{9j}sons + \beta_{10j}husbandedu + \beta_{11j}wealthindex + \beta_{12j}region$$

$$+ \varepsilon \ldots\ldots. (1)$$

Equation 1 represents the logarithm of the ratio of two probabilities (3–1) on the left side, and a linear combination of the predictors on the right. The dependent variable is perceived pregnancy intendedness comprising j categories, namely intended, mistimed, and unwanted. The estimation of the model requires the calculation of j-1 equations, one for each category (mistimed/unwanted) relative to the reference category (intended pregnancy), to measure the likelihood of the association of each covariate with the outcome variable. The simplified version of Equation 1 comprising only WDMI as an explanatory variable was estimated as Model 1 (see Table 4.)

3   RESULTS

3.1   Background Characteristics of Women

Table 1 presents summary statistics of the background characteristics of women age 15–49 who had experienced pregnancy in the five years prior to the survey. This reveals that 86% women had a planned pregnancy, whereas only 14% reported an unintended pregnancy. In terms of education, the majority of women (53%) had either no formal education or only primary school, as shown in Table 1. Conversely, the husbands had higher educational attainment across all levels. This highlights gender inequality in education in Pakistan. With marriage, most women had their first marriage between age 15 to 24, which aligned closely with the median age of first marriages in Pakistan at age 21.

For children, 43% of the women had 3 to 5 children, and 76% had 1 to 3 sons among all their children. About 32% women terminated a pregnancy for birth-related complications such as miscarriage, abortion, and stillbirths. The FP data showed that 51% women used contraceptives to avoid pregnancy within the last five years. In addition, the data revealed that 66% women lived in the rural areas, and 20% came from the poorest households

Table 1   Percentage distribution of the background characteristics of women (age 15–49) who ever had experienced pregnancy

Characteristics	Level	Percent	Number of respondents
Pregnancy outcomes	Planned	86.1	5,777
	Mistimed	7.2	485
	Unwanted	6.7	449
	Total	100	6,711
Women's education	No education	47.9	3,212
	Primary	16.3	1,097
	Secondary	22.2	1,492
	Higher	13.6	911
	Total	100	6,711
Husband's education	No formal education	28.7	1,889
	Primary	16.5	1,085
	Secondary	35.2	2,316
	Higher	19.6	1,293
	Total	100	6,583
Women's age (in years)	15–24	23	1,545
	25–39	70.8	4,753
	40–49	6.2	413
	Total	100	6,711
Age at first marriage	10 to 14	7.6	509
	15–24	81.3	5,458
	25–47	11.1	744
	Total	100	6,711
Total children	1–2 children	41	2,749
	3–5 children	43.2	2,898
	6 and above	15.9	1,064
	Total	100	6,711

Continues…

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Table 1—*Continued*

Characteristics	Level	Percent	Number of respondents
Number of sons	No son	20.4	1,370
	1–3 sons	72.2	4,843
	4 and above sons	7.4	499
	Total	100	6,711
Contraceptive use	No	49	3,286
	Yes	51	3,426
	Total	100	6,711
Terminated pregnancy	No	67.7	4,545
	Yes	32.3	2,166
	Total	100	6,711
Place of residence	Urban	33.5	2,248
	Rural	66.5	4,463
	Total	100	6,711
Wealth index	Poorest	21.5	1,444
	Poorer	19.4	1,299
	Middle	20.4	1,371
	Richer	20.1	1,349
	Richest	18.6	1,248
	Total	100	6,711

3.2 Women's Autonomy (Women Decision Making Index-WDMI) Components

Table 2 presents the Women Decision Making Index or WDMI, which measures women's autonomy based on their relative bargaining power within households. The data reveal that approximately 45% women were classified as having no autonomy, while 10% to 13% had little or medium autonomy, and 31% had higher autonomy. Just under half (47%) of the women make decisions, alone and jointly with husband, about their healthcare; 40% had input into major purchasing decisions, and 44% participate in decisions related to their moving out to meet relatives

Table 2   Women's decision making index (WDMI) and its components

Variable	Level	Percent	Number
Women's decision making index (WDMI)	No	44.7	3,002
	Low	13.5	903
	Medium	10.3	693
	High	31.5	2,113
	Total	100	6,711
Person who usually decides on respondent's health care	Husband only or someone else	53.8	3,608
	Respondent alone and jointly with husband	46.2	3,103
	Total	100	6,711
Person who usually decides on large household purchases	Husband only or someone else	58.4	3,928
	Respondent alone and jointly with husband	41.6	2,783
	Total	100	6,711
Person who usually decides on visits to family or relatives	Husband only or someone else	55.9	3,751
	Respondent alone and jointly with husband	44.1	2,960
	Total	100	6,711

Figure 2 illustrates the pregnancy intendedness across the different levels of the decision-making index. The highest percentage of planned pregnancies is observed among women with no autonomy, followed by women with high autonomy [chi square 62.16; p<0.01]. However, the proportions of mistimed and unwanted pregnancies are also higher among women with similar levels of autonomy. This indicates a higher overall prevalence of pregnancies among women with either "no" or "high" autonomy as compared to those with little and medium decision-making power.

Figure 2   Pregnancy desires at different women levels of women's autonomy

Pregnancy intentions for different levels of women's autonomy
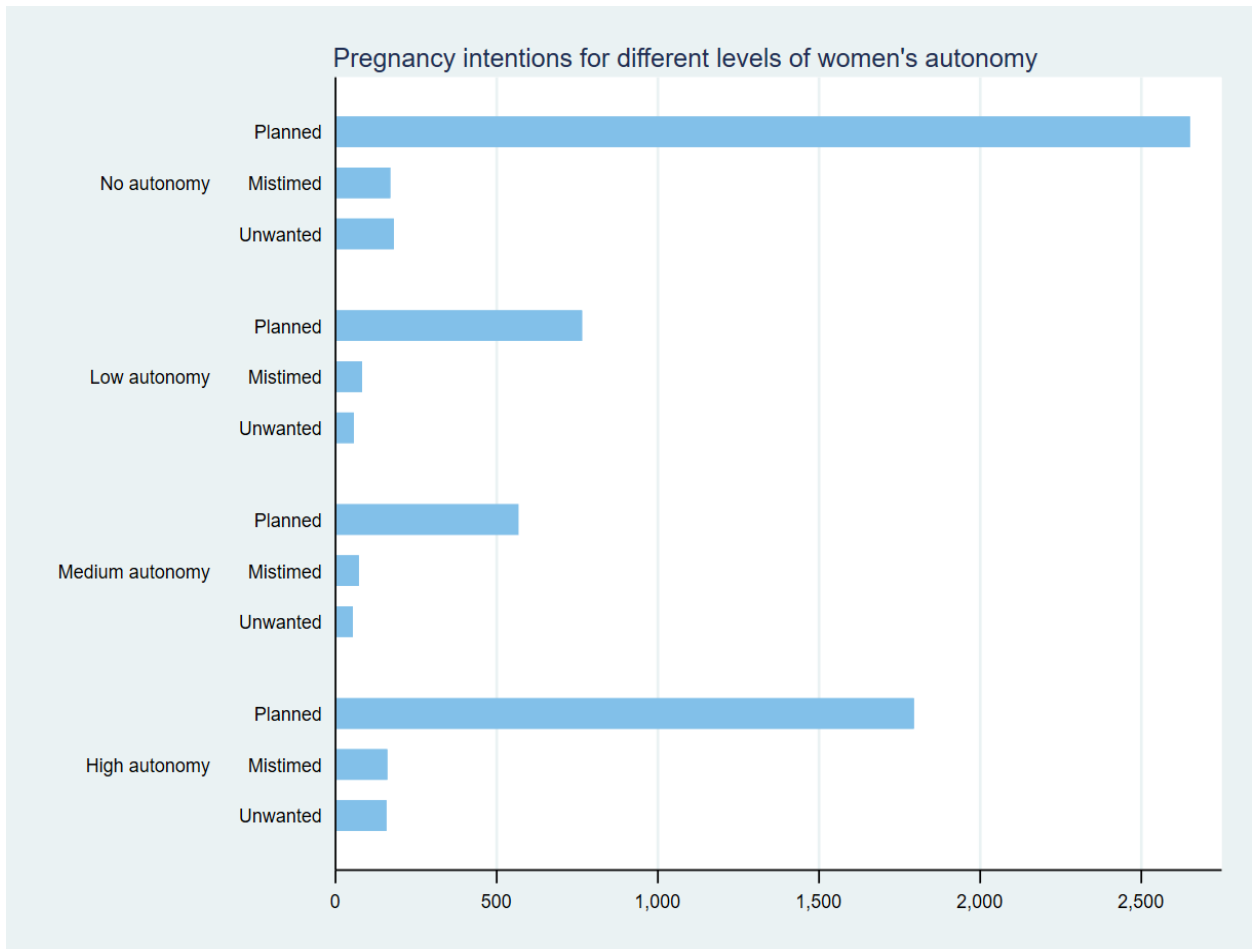
3.3 Association of Perceived Pregnancy Intendedness with Women's Autonomy and Other Co-variates

Table 3 presents the results from the bivariate analyses. The women's autonomy, measured as WDMI, had a significant association with pregnancy intendedness at the 5% level, as indicated by the p-value 0.01 associated with the chi-square statistic. The mistimed pregnancies were more prevalent among women with medium (10.4%) and low (9.1%) autonomy levels compared to those with no or high autonomy. We also explored the association between education and perceived pregnancy. Women with no education, primary, and secondary education were associated with 6.7%, 7.7% and 7.1%, respectively, of unwanted pregnancy, while those with higher educational qualification had 4.6% [chi 132.9; $p < 0.001$].

Table 3 **Associations of pregnancy intendedness with women's autonomy (WDMI) and covariates**

Variables	Planned		Mistimed		Unwanted		Total	Number of respondents
	%	CI	%	CI	%	CI	%	
WDMI								
No autonomy	88.3	[86.5,89.9]	5.7	[4.5,7.1]	6	[4.9,7.4]	100	3002
Low	84.6	[81.0,87.6]	9.1	[6.9,12.0]	6.3	[4.4,9.0]	100	904
Medium	81.9	[77.9,85.3]	10.4	[7.7,13.8]	7.7	[5.4,10.9]	100	693
High	84.9	[82.6,87.0]	7.6	[6.0,9.6]	7.5	[6.1,9.2]	100	2113
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(6) = 62.1627								
Design-based F(5.65, 2518.18) = 2.8465 Pr = 0.011								
Women's education								
No education	88.6	[87.0,90.0]	4.7	[3.7,5.8]	6.7	[5.6,8.1]	100	3212
Primary	83.3	[79.8,86.3]	9	[7.0,11.6]	7.7	[5.6,10.6]	100	1097
Secondary	82.6	[78.8,85.8]	10.3	[7.8,13.4]	7.1	[5.5,9.1]	100	1492
Higher	86.3	[83.0,89.1]	9.1	[7.0,11.9]	4.6	[3.0,7.0]	100	911
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(6) = 132.9276								
Design-based F(5.53, 2466.57) = 5.6434 Pr < 0.001								
Husband's education								
No education	86.3	[84.1,88.2]	5.6	[4.3,7.4]	8.1	[6.6,9.9]	100	1889
Primary	84.2	[80.5,87.3]	9.2	[6.9,12.3]	6.6	[4.6,9.2]	100	1085
Secondary	86.3	[84.0,88.3]	7.1	[5.7,8.9]	6.6	[5.4,8.0]	100	2316
Higher	86.9	[84.4,89.1]	8.2	[6.5,10.4]	4.8	[3.5,6.7]	100	1293
Total	86.1	[84.7,87.3]	7.3	[6.4,8.3]	6.7	[5.8,7.6]	100	6583
Pearson: Uncorrected chi2(6) = 50.4571								
Design-based F(5.69, 2537.44) = 2.3003 Pr = 0.035								
Women's age								
15–24	91.7	[89.4,93.5]	8	[6.2,10.3]	0.3	[0.1,1.0]	100	1545
25–39	85.4	[83.7,86.9]	7.3	[6.3,8.5]	7.3	[6.3,8.5]	100	4753
40–49	73.4	[68.0,78.2]	3.4	[1.6,6.9]	23.2	[18.6,28.6]	100	413
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(4) = 530.1872								
Design-based F(3.91, 1745.15) = 38.5244 Pr < 0.001								

Continues…

Table 3—*Continued*

Variables	Planned %	Planned CI	Mistimed %	Mistimed CI	Unwanted %	Unwanted CI	Total %	Number of respondents
Age at first marriage								
10 to 14	84.9	[80.6,88.4]	5	[3.2,7.7]	10.1	[7.1,14.3]	100	509
15–24	85.8	[84.2,87.3]	7.3	[6.2,8.5]	6.9	[6.0,8.0]	100	5458
25–47	89	[85.5,91.8]	8.3	[5.8,11.9]	2.6	[1.6,4.4]	100	744
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(4) = 61.2500								
Design-based F(3.66, 1632.19) = 4.6795 Pr = 0.001								
Total children								
1–2 children	93.8	[92.0,95.2]	6.1	[4.7,7.9]	0.1	[0.0,0.6]	100	2749
3–5 children	83.8	[81.9,85.5]	9.3	[8.0,10.8]	6.9	[5.7,8.3]	100	2898
6 and above	72.5	[68.2,76.3]	4.4	[2.9,6.5]	23.2	[19.6,27.2]	100	1064
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(4) = 1262.4483								
Design-based F(3.69, 1646.63) = 81.4823 Pr < 0.001								
Number of sons								
No son	93.3	[91.2,94.9]	6.5	[4.9,8.5]	0.3	[0.1,1.0]	100	1370
1–3 sons	85.4	[83.6,87.0]	7.9	[6.8,9.3]	6.7	[5.7,7.7]	100	4843
4 and above sons	73.1	[67.6,78.0]	2.3	[1.2,4.6]	24.5	[19.7,30.1]	100	499
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(4) = 664.8479								
Design-based F(3.88, 1728.55) = 51.4781 Pr < 0.001								
Contraceptive use								
No	93.9	[92.7,95.0]	3.6	[2.8,4.7]	2.4	[1.8,3.3]	100	3286
Yes	78.5	[76.4,80.6]	10.7	[9.3,12.3]	10.8	[9.4,12.3]	100	3426
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(2) = 620.6686								
Design-based F(2.00, 890.82) = 87.3683 Pr < 0.001								
Terminated pregnancy								
No	88.8	[87.3,90.2]	6.7	[5.7,7.9]	4.5	[3.7,5.5]	100	4545
Yes	80.4	[77.7,82.8]	8.4	[6.8,10.3]	11.3	[9.5,13.3]	100	2166
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(2) = 216.8789								
Design-based F(1.96, 875.03) = 27.9692 Pr < 0.001								
Type of place of residence								
Urban	84.2	[82.2,86.0]	8.6	[7.3,10.2]	7.2	[5.8,8.9]	100	2248
Rural	87	[85.2,88.7]	6.5	[5.4,7.9]	6.4	[5.5,7.5]	100	4463
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(2) = 21.7789								
Design-based F(2.00, 891.36) = 2.8237 Pr = 0.060								
Wealth index								
Poorest	90.6	[88.5,92.4]	3.8	[2.7,5.2]	5.7	[4.1,7.8]	100	1444
Poorer	87	[84.3,89.4]	6.6	[5.0,8.7]	6.3	[4.7,8.5]	100	1299
Middle	81.3	[77.9,84.2]	9.5	[7.4,12.2]	9.2	[7.0,12.1]	100	1371
Richer	84.1	[80.7,87.1]	8.7	[6.6,11.4]	7.2	[5.3,9.6]	100	1349
Richest	87.3	[84.8,89.5]	7.7	[5.8,10.2]	5	[3.7,6.7]	100	1248
Total	86.1	[84.7,87.3]	7.2	[6.3,8.3]	6.7	[5.9,7.6]	100	6711
Pearson: Uncorrected chi2(8) = 126.6708								
Design-based F(7.40, 3301.70) = 4.1112 Pr <0.001								

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Figure 3 illustrates the women's perceived pregnancy desires across the different education levels. The figure shows that uneducated woman had a higher rate of both planned and unwanted pregnancies compared to their counterparts with some education, while women with secondary and higher education had a higher prevalence of mistimed pregnancies.

Figure 3   Pregnancy intendedness by women's education

Pregnancy intention by women's education
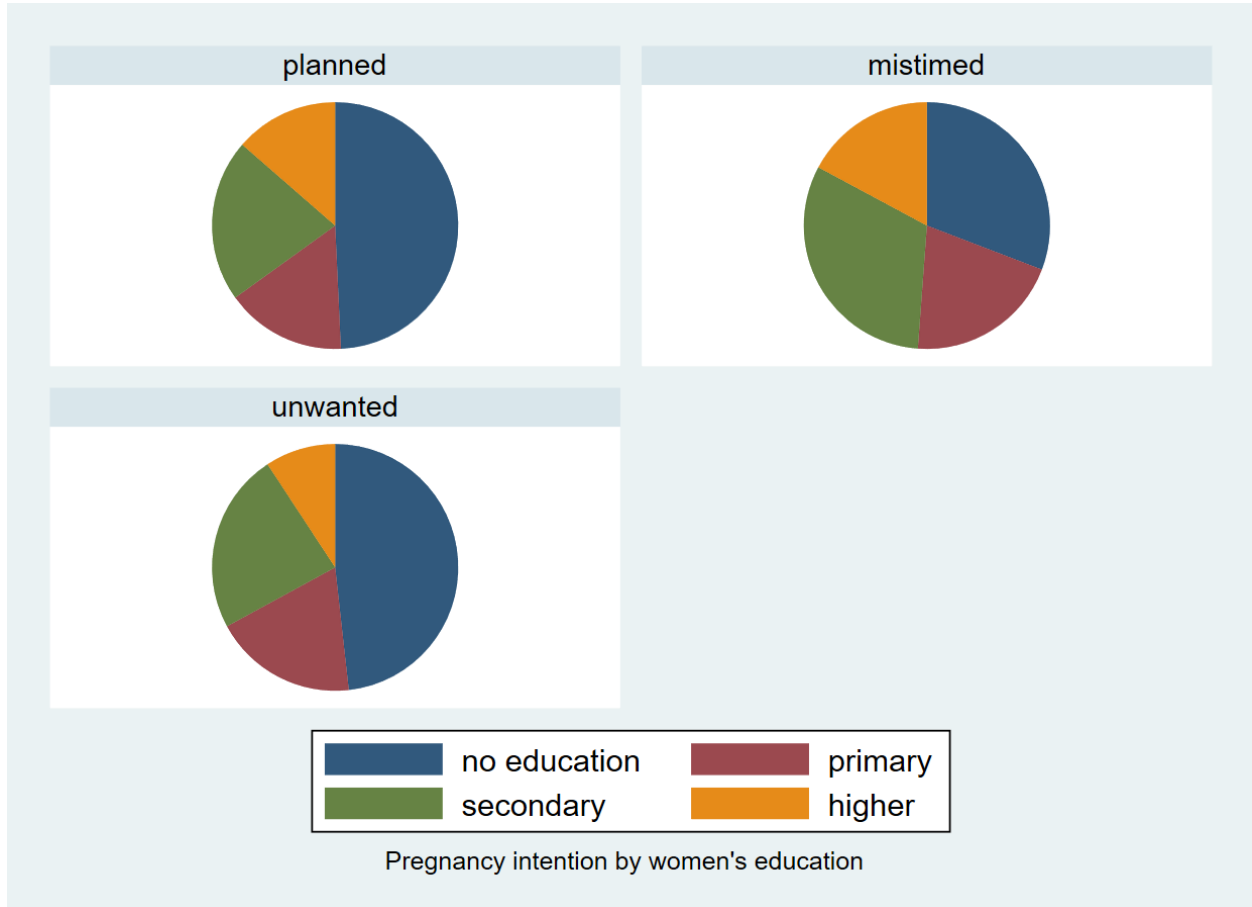
Table 3 also shows a significant association between women who had husbands with no education and a higher rate of unwanted perceived pregnancies. Figure 4 provides additional data on the education levels of women and their husbands in relation to perceived pregnancy intendedness. Couples without any formal education had a higher number of unwanted pregnancies. As the education level of the couple increased from primary to secondary and higher, the rate of unwanted pregnancies decreased.

Figure 4   **Pregnancy intendedness by couple's education level**
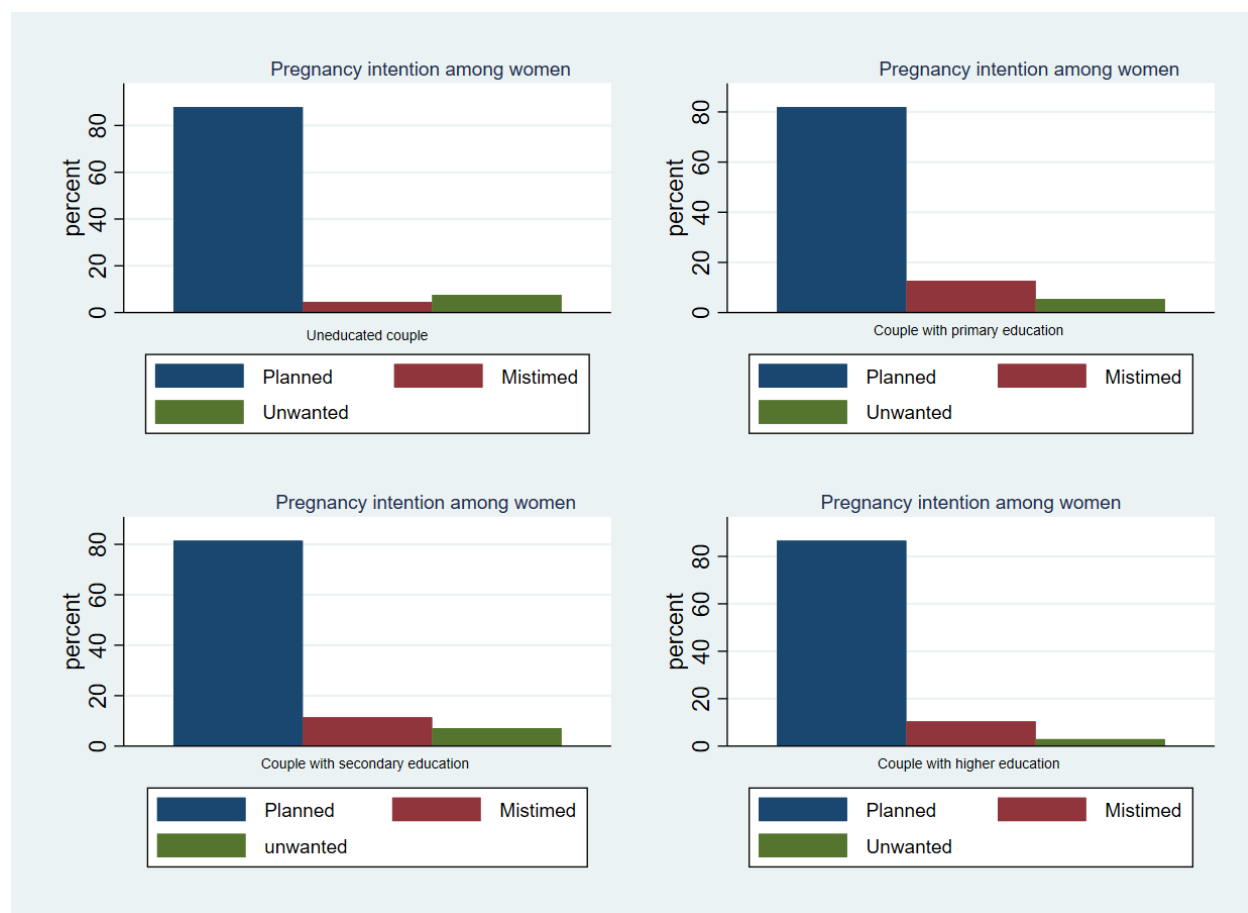
The analysis demonstrated a significant association (p-value < 0.001) between the age at first marriage and perceived pregnancy desires. Among women who married between the age 10 and 14, 10% of their pregnancies in the five years before the survey was unwanted, compared to 2.6% of those who married over the age of 25. The data further indicated that as the age at first marriage increases for women, the rate of unwanted pregnancies decreases. This suggested the positive role of marriage age in preventing unintended pregnancies in Pakistan (see Table 3).

Similarly, there was a higher prevalence of unwanted pregnancy among women with four and more sons [p<0.001]. This may be attributed to the cultural preference for male children, which leads couples to continue expanding their families until they have more sons[31] In Pakistan, which is predominantly an agrarian society, male labor plays a crucial role in the agricultural economy. Families with more sons have readily available physical labor for their farms. In addition, the absence of social security in old age compels parents to rely on their sons for economic support, because cultural norms often do not accept women working and earning.[4,6]

Contrary to expectations, women in urban areas had a higher incidence of unwanted and mistimed pregnancies compared to their rural counterparts. However, these results did not show statistical significance at the 5% level, as indicated in Table 3. Another surprising finding is the association between pregnancy intendedness and wealth index. Women from middle and affluent families were associated with

a higher number of unintended pregnancies, both mistimed and unwanted, compared to the poorest households (see Table 3).

3.4   Results of Regression Analysis

The study used multinomial logit regression to estimate the association of pregnancy intendedness with women's autonomy, along with other covariates. The outcome variable included three nominal categories: planned, mistimed, and unwanted. Model 1 presents results for the relationship between pregnancy intendedness and women's autonomy. Compared to "no autonomy," women with low, medium, and high levels of decision-making capacity were associated with a higher relative risk of having mistimed pregnancy (base category: planned pregnancy) (see Table 4). The relative risks ratios were calculated as follows: exp (0.51) =1.67, exp (0.68) =1.97, exp (0.33) =1.39 for low, medium, and high, respectively. However, the results were not significant for the unwanted pregnancy outcome, except for high autonomy. These findings are contrary to the theory and evidence. Nevertheless, Model 1 has been estimated without accounting for confounding variables.

This study conducted Model 2 to explore the relationship between pregnancy intendedness and the WDMI (Women's Decision-Making Index), while also considering other covariates. When other confounding variables are accounted for, the WDMI did not show significant association with mistimed and unwanted pregnancies relative to the planned, which implied the role of confounding variables in attenuating the relationship. However, the medium autonomy showed a positive association with the relative risk ratio of mistimed pregnancy (RRR 1.55). One plausible explanation is the specific construct of WDMI, which measures women's bargaining power based on their individual and joint decision-making with their husbands. There is a strong possibility that joint decision making did not reveal the equal or balanced participation of men and women in decisions due to biased gender norms and patriarchal values[23]

The relative risk ratios (RRR) of experiencing mistimed pregnancies were found to be 196% higher (exp (1.08) = 2.96), and 229% higher (exp (1.191) = 3.29) of unwanted pregnancies associated with life-time contraceptives, compared to those with planned pregnancies. These results are not unexpected, given the frequent occurrence of contraceptive failure in developing countries. Approximately 30% of unintended pregnancies can be attributed to contraceptive failure among women who use traditional or modern contraceptive methods. This high proportion underscores the significance of contraceptive effectiveness in preventing unintended pregnancies.[39–42] This may also be due to a higher preference for planned pregnancy among women, as those who don't use contraception may also be more intentional in their fertility planning and more likely to report a mistimed pregnancy than women who believe it is out of their control or was God's will.

Women's education had a positive, significant association with the relative risk ratio of experiencing unintended pregnancies, which contradicts the existing evidence.[43,44] However, these results are not unexpected when considering the societal context in Pakistan, which is predominantly patriarchal. Even among the most educated women, decision-making autonomy is limited, and their participation in the job market is nominal, which results in financial dependence on their spouses for meeting their all needs, including healthcare.[7] The number of sons was found to be a significant predictor of unwanted pregnancies, as indicated in Table 4. However, the results were not significant for mistimed pregnancies. Previous studies have highlighted the role of gender in determining unintended pregnancies in Pakistan[45] Furthermore, the

wealth index was positively associated with the relative risk ratio of unwanted pregnancy, and the effect was more pronounced among the affluent households.

Model 3 estimates women's autonomy as a predictor and as a moderating variable, after accounting for all other covariates. The results showed that women's autonomy in neither role is associated significantly with pregnancy intendedness. The life-time contraceptive use was associated with higher relative risk ratios of mistimed and unwanted pregnancy compared to the planned. However, the magnitude of relative-risk-ratios for both mistimed and unwanted was lower compared to Model 2, which was estimated without the moderating effect of women's autonomy.

Table 4   Multinomial logistics regression analysis

Variables	Model 1			Model 2			Model 3		
	Planned	Mistimed	Unwanted	Planned	Mistimed	Unwanted	Planned 2	Mistimed 2	Unwanted 2
Women's autonomy (RC: no autonomy)									
Low		0.519***	0.0844		0.341	0.0397		0.164	-0.610
		(0.191)	(0.235)		(0.202)	(0.264)		(0.385)	(0.454)
Medium		0.685***	0.325		0.436**	-0.0675		0.218	-0.590
		(0.207)	(0.215)		(0.217)	(0.219)		(0.404)	(0.530)
High		0.334	0.254		0.143	-0.00341		-0.0995	-0.572
		(0.175)	(0.154)		(0.195)	(0.180)		(0.351)	(0.440)
Contraceptives ever used (RC: NO)					1.087***	1.191***		0.904***	0.812***
					(0.165)	(0.200)		(0.251)	(0.292)
Women's autonomy x contraceptives ever used (RC: no-autonomy/NO)									
Low (yes)								0.267	0.834
								(0.447)	(0.536)
Medium (yes)								0.315	0.684
								(0.482)	(0.589)
High (yes)								0.344	0.729
								(0.403)	(0.501)
Highest education level (RC: no education)									
Primary					0.463***	0.526**		0.462***	0.516**
					(0.178)	(0.220)		(0.178)	(0.222)
Secondary					0.685***	0.768***		0.686***	0.771***
					(0.185)	(0.248)		(0.186)	(0.250)
Higher					0.782***	1.045***		0.777***	1.032***
					(0.224)	(0.373)		(0.225)	(0.376)
Husband/partner's education level (RC: NO education)									
Primary					0.238	-0.334		0.236	-0.336
					(0.232)	(0.248)		(0.231)	(0.250)
Secondary					-0.229	-0.409**		-0.228	-0.402
					(0.180)	(0.204)		(0.179)	(0.205)
Higher					-0.155	-0.779***		-0.154	-0.776***
					(0.217)	(0.275)		(0.216)	(0.277)
Women's current age (in years) (RC: 15–24)									
25–39					-0.669***	0.942		-0.669***	0.940
					(0.189)	(0.606)		(0.190)	(0.612)
40–49					-1.157***	1.474**		-1.158***	1.475**
					(0.400)	(0.649)		(0.400)	(0.654)

Continues…

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Table 4—*Continued*

Variables	Model 1			Model 2			Model 3		
	Planned	Mistimed	Unwanted	Planned	Mistimed	Unwanted	Planned 2	Mistimed 2	Unwanted 2
Age at first marriage (RC: 10–14)									
15–24					0.272	-0.0136		0.268	-0.0256
					(0.274)	(0.243)		(0.273)	(0.242)
25–47					0.582	-0.577		0.578	-0.588
					(0.351)	(0.409)		(0.350)	(0.410)
Total children ever born (RC: 1–2)									
3–5 children					0.691***	17.53***		0.695***	17.53***
					(0.210)	(0.463)		(0.211)	(0.181)
6 and above					0.645**	18.85***		0.650**	18.86***
					(0.312)	(0.506)		(0.313)	(0.276)
Number of sons in the family (RC: no sons)									
1 to 3					0.0311	2.956***		0.0317	2.973***
					(0.229)	(0.666)		(0.229)	(0.667)
4 and above					-0.798*	3.494***		-0.795	3.515***
					(0.466)	(0.687)		(0.467)	(0.687)
Ever had a terminated pregnancy (RC: no)					0.262	0.646***		0.26	0.641***
					(0.145)	(0.161)		(0.145)	(0.162)
Place of residence (RC: urban)					-0.155	-0.241		-0.154	-0.241
					(0.172)	(0.191)		(0.172)	(0.191)
Wealth index combined (RC: poorest)									
Poorer					0.370	0.255		0.370	0.271
					(0.232)	(0.264)		(0.230)	(0.264)
Middle					0.465	0.754***		0.463	0.761***
					(0.254)	(0.260)		(0.254)	(0.263)
Richer					0.190	0.786***		0.189	0.803***
					(0.270)	(0.293)		(0.267)	(0.291)
Richest					-0.136	0.365		-0.136	0.384
					(0.320)	(0.316)		(0.319)	(0.318)
Constant		-2.748***	-2.685***		-3.984***	-25.37***		-3.864***	-25.11***
		(0.122)	(0.110)		(0.379)	(0.970)		(0.419)	(0.872)
Observations	6,803	6,803	6,803	6,690	6,690	6,690	6,690	6,690	6,690
F statistic		2.99			38.7			309.41	
Probability		0			0			0	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4 DISCUSSION

Women's autonomy has been a key indicator of reproductive health over the past decade, particularly in developing nations.[46] In Pakistan, where patriarchy and social norms restrict women's ability to make significant decisions, it is especially crucial to understand the relationship between the autonomy of women and unintended pregnancy. By using nationally representative data from the Demographic Health Survey (DHS) of Pakistan, the current study evaluated the relationship between women's autonomy and their intentions to become pregnant.

While examining how female autonomy affects unintended pregnancy, the bivariate association shows that mistimed pregnancies were more prevalent among women with low, medium, and higher autonomy levels as compared to those with no autonomy. This is contrary to findings in many settings where results have shown that women with greater autonomy in household decision-making have lower odds of reporting unintended births or pregnancies.[46] These results reflect specific attributes of Pakistani culture where women with no autonomy are more likely to be in abusive relationships. These women may fear reporting a pregnancy as unwanted and mistimed due to the potential negative reactions or violence from their partners or family members.[47] On the other hand, women with high autonomy generally have better access to quality ANC and stronger social and financial networks and are less likely to report their pregnancy as unwanted or mistimed.[48]

This finding highlights the prevalence of early marriage in Pakistan, which is influenced by cultural norms. In many cases, girls' marriages are arranged within extended families even before their births. Cultural practices such as dowry, bride exchange, and other traditional rituals contribute to the prevalence of child marriage, particularly in rural areas of Pakistan.[7] Furthermore, the wealth index was also significantly associated with the relative risk of unwanted pregnancies, particularly among women in affluent households when compared to the poorest. These results contradict existing evidence. However, they are aligned with the societal context of Pakistan where education is a privilege for the rich. Affluent women have access to education, resources, and reproductive healthcare, and are more likely to have the knowledge and means to prevent unwanted pregnancies. These women may also be more likely to report unwanted pregnancies as they have the agency and support to make decisions about their reproductive health. These findings are supported by a 2015 study conducted in Nepal, which suggested that women with lower levels of education may have lower expectations about their ability to control the timing of their pregnancies, and hence, may be less likely to have mistimed pregnancies.[46]

Another interesting result was the higher relative risk of experiencing mistimed pregnancies among women who were using contraceptives, compared to those with planned pregnancies. These results are not unexpected, given the poor quality of contraceptives in developing countries. Bradley highlighted the ineffectiveness of some contraceptive methods in preventing unintended pregnancies. About 30% of unintended pregnancies can be attributed to the contraceptive failure among women who use traditional or modern contraceptive methods.[48]

The multinomial logit regression analysis demonstrates a positive relationship between maternal age and the likelihood of unwanted pregnancies. This indicated that as women age, their chances of experiencing unwanted pregnancies increase. Conversely, a negative association was observed between maternal age and

the likelihood of mistimed pregnancies, which suggested that older women are less likely to experience pregnancies that are mistimed. One reason could be that younger women are more fertile, are exposed to an extended period in which they can become pregnant, and prefer to delay pregnancy. Moreover, these women are young and are less willing to seek sterilization. This corroborates data from a study in Bangladesh which found a negative relationship between age at first marriage and unintended pregnancy.[49] These findings underscore the requirements for focused interventions and reproductive health policies that consider the diverse needs and circumstances of women across different age groups. Such policies aim to improve access to FP resources, enhance contraceptive use, and ultimately, reduce the rates of unintended pregnancies.

This study offers insights into the education levels of women and their husbands in relation to various perceived pregnancy desires. The results show the significant association between women with husbands having no education and a higher rate of unwanted perceived pregnancies. The education level of husbands is a significant factor in unintended pregnancies. Husbands with higher education levels tend to be more involved in FP decisions, possess a better knowledge of contraception, and are more supportive of their partners' use of contraception, which reduces the risk of unintended pregnancies. Conversely, husbands with lower education levels may have limited knowledge about contraception, adhere to traditional gender roles, and may not participate in FP decisions, which increase the risk of mistimed pregnancies.

A study conducted in southern Ethiopia has found that unintended pregnancies were most consistently linked to the lowest education status of husbands. Women married to college or university-educated men had a 60% reduced odds ratio of experiencing unintended pregnancies.[50] In high-income countries such as the United States, the educational level of husbands did not significantly affect unintended pregnancies. This suggests that Pakistan may have unique cultural norms and values that may increase the risk of mistimed pregnancies among husbands with lower education status. Moreover, couples without any formal education had a higher number of unwanted pregnancies, and as the education level of the couple increased from primary to secondary and higher, the rate of unwanted pregnancies decreased. This highlights the importance of couples' education in preventing unwanted pregnancies.

This study finds that there is a positive association between the number of children a woman has had and the probability of reporting an unwanted pregnancy. This corroborates the fact that the more children a woman has, the more likely she is to feel and categorize her pregnancy as unwanted. This also suggests that women with a greater number of children may face unique challenges in accessing services and effectively using contraception. These results underscore the importance of providing accessible FP services and effective contraception to women, especially those with multiple children, to minimize the risk of unwanted pregnancy.

5   CONCLUSION

The research findings offer valuable insights into the complex relationship between women's autonomy in household decision-making and the pregnancy intendedness in Pakistan. It is important to recognize that this relationship is influenced by various other cultural and socioeconomic factors. The findings suggest a positive association between women's autonomy and the occurrence of unintended pregnancies among Pakistani women, although the analysis did not account for other covariates. The relationship became insignificant when other factors such as women's age, age at first marriage, education levels of both women and their husbands, place of residence, wealth index, number of children and sons, and contraceptive use are considered while estimating the model. Moreover, the research does not find a significant moderating role of women's autonomy in the relationship between contraceptive use and unintended pregnancies, which indicated the complexity of this relationship. Therefore, comprehensive research is needed to measure women's autonomy in the context of Pakistan.

The results call for adopting a holistic approach to FP to reduce unintended pregnancies and improve the overall health of women and their children in Pakistan. Several key steps are necessary to implement such a strategy. First, the government should consider raising the legal age for marriage, which would empower women by providing them with more time for education and informed decision-making about their reproductive health. In addition, it is essential for Pakistan to promote the efficient, effective use of contraceptives, and to ensure that women have access to a range of FP methods and the necessary knowledge about their use. Furthermore, since the education of a couple may play a significant role in reducing unintended pregnancies and should be given due attention. Addressing societal attitudes and norms about women is also imperative, as are strong advocacy efforts that challenge existing gender biases and gender inequality in Pakistan.

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